

## FATTY ACIDS FROM SEEDS OF *Sophora flavescens* AND *Styphnolobium japonicum*

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Fatty acids from seeds of the family Fabaceae are currently of great interest due to their high content of polyunsaturated fatty acids [1]. Therefore, we continue to study the chemical composition of the species *Sophora flavescens* Soland, for which the seed carbohydrates were previously reported [2]. The goal of our work was to determine the fatty-acid composition of total lipids from seeds of *S. flavescens* and the related species *Styphnolobium japonicum* (L.) Schott (syn. *Sophora japonica* L.), seeds of which are used in official medicine as an antiseptic and wound-healing agent [3]. The fatty-acid composition of both species has not been published.

Seeds of *S. flavescens* were collected near Savateevo (Chita Oblast, September 2007); of *S. japonicum*, near Yalta (August 2007). Lipids were extracted by the Folch method [4]. The group composition was determined by separating lipids into neutral lipids (NL), glycolipids (GL), and phospholipids (PL) using column chromatography over silica gel. NL eluted with  $\text{CHCl}_3$ ; GL, acetone; PL, methanol. The content of each lipid group was established gravimetrically after removing solvent. The fatty-acid composition of total lipids was determined after methylation of the total lipid fraction [4] using an Agilent GC—MS (MS detector, PH-Innowax column, 30 m  $\times$  250  $\mu\text{m}$ , 0.50  $\mu\text{m}$ , 150-250°C temperature gradient, heating rate 2°C/min, He carrier gas, flow rate 1 mL/min).

The total lipid content in seeds of *S. flavescens* and *S. japonicum* was 3.37 and 5.31%, respectively. This is an average value for seeds of Fabaceae plants (1.0-7.2%) [1]. The lipid fractions of *S. flavescens* were dominated by NL; *S. japonicum*, PL (NL 74.22  $\pm$  2.34 and 39.04  $\pm$  1.38; GL, 8.70  $\pm$  0.41 and 9.18  $\pm$  0.55; PL, 15.05  $\pm$  0.57 and 50.54  $\pm$  1.37% of the mass of the total lipid fraction, respectively).

Fatty acids of total lipids from *S. flavescens* seeds contained 16 compounds; from *S. japonicum*, 15. The saturated:unsaturated acid ratios were 1:1.14 and 1:4.63 (Table 1). Palmitic, linoleic, oleic, and stearic acids dominated for each species. The total content of them was 86.47 and 90.49% of the total acids, respectively. The significant content of palmitic acid in lipids of *S. flavescens* (34.28%), in contrast with *S. japonicum*, for which linoleic acid was the dominant one (54.95%), should be noted.

TABLE 1. Fatty-Acid Composition of Total Lipids from *S. flavescens* and *S. japonicum* Seeds, % of Fatty-Acid Mass

| Acid                  | <i>S. flavescens</i> | <i>C. japonicum</i> | Acid                    | <i>S. flavescens</i> | <i>C. japonicum</i> |
|-----------------------|----------------------|---------------------|-------------------------|----------------------|---------------------|
| 14:0                  | 0.92                 | -                   | 16:1n-7                 | 0.65                 | 0.08                |
| 15:0                  | 0.60                 | 0.07                | 16:1n-9                 | 0.52                 | 0.08                |
| 16:0                  | 34.28                | 7.87                | 18:1n-7                 | 2.99                 | 1.11                |
| 17:0                  | 1.36                 | 0.17                | 18:1n-9                 | 13.26                | 21.08               |
| 18:0                  | 6.87                 | 6.59                | 20:1n-9                 | 0.27                 | -                   |
| 20:0                  | 1.01                 | 1.36                | 20:1n-11                | -                    | 0.53                |
| 21:0                  | 0.44                 | -                   | 18:2n-6                 | 32.06                | 54.95               |
| 22:0                  | 0.71                 | 1.59                | 18:3n-3                 | 3.56                 | 3.49                |
| 23:0                  | 0.49                 | -                   | 20:3n-6                 | -                    | 0.24                |
| $\Sigma_{\text{Sat}}$ | 46.68                | 17.65               | 21:5n-3                 | -                    | 0.10                |
|                       |                      |                     | $\Sigma_{\text{Unsat}}$ | 53.31                | 81.66               |

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In general, the distributions of fatty acids lead to the conclusion that they are similar to previous data for Fabaceae lipids, for which palmitic, oleic, and linoleic acids were the principal ones. The fatty-acid composition of *S. flavescens* was typical of those for *Vigna inguiculata* L., *V. sinensis* L., and *Lathyrus sativus* L.; of *S. japonicum*, for *Lupinus* spp., *Cicer arietinum* L., and *Glycine max* L. [5, 6].

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